

# Critical Thresholds:

Can't live with 'em,  
Can't live without 'em

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National Adaptation Forum April 2<sup>nd</sup>, 2013



**adaptation**  
international

# Extreme Events

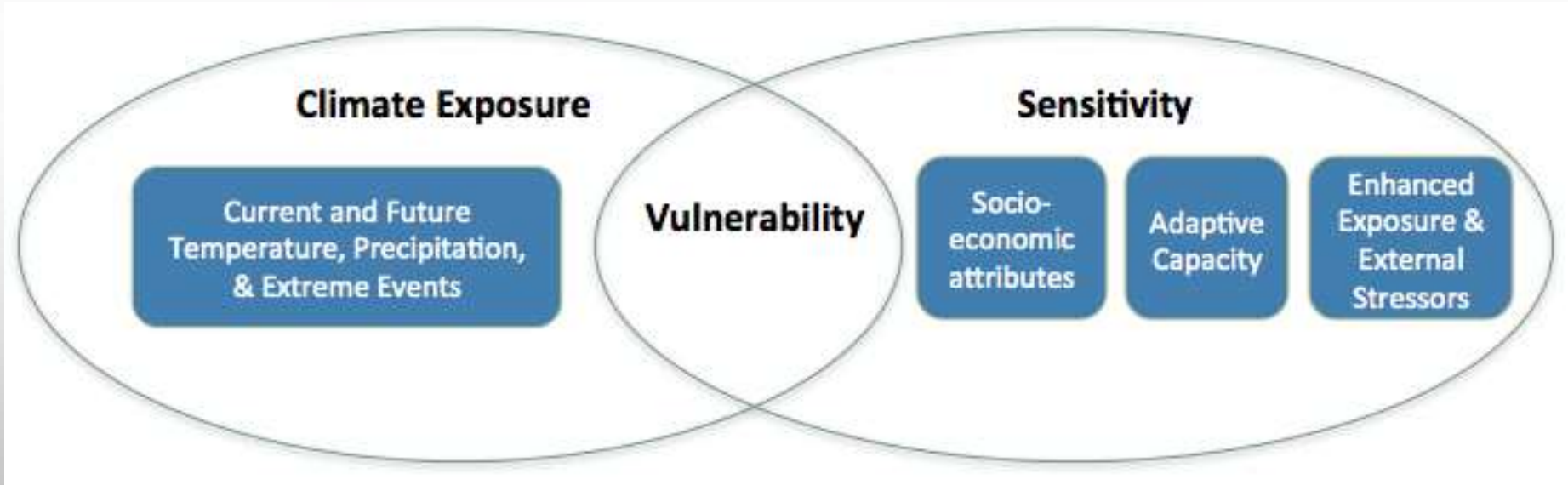


Katrina, FEMA 2005



Human Health Perspective on  
Climate Change. 2010. NIEHS

# What's Extreme?



# What's Extreme?

## Climate Exposure

- \* Extent, magnitude and duration of weather event

## Sensitivity

- \* Susceptibility to impact

## Adaptive Capacity

- \* Ability to respond or adjust to changing conditions

## Climate Science Extremes

## Community Extremes



# Objectives

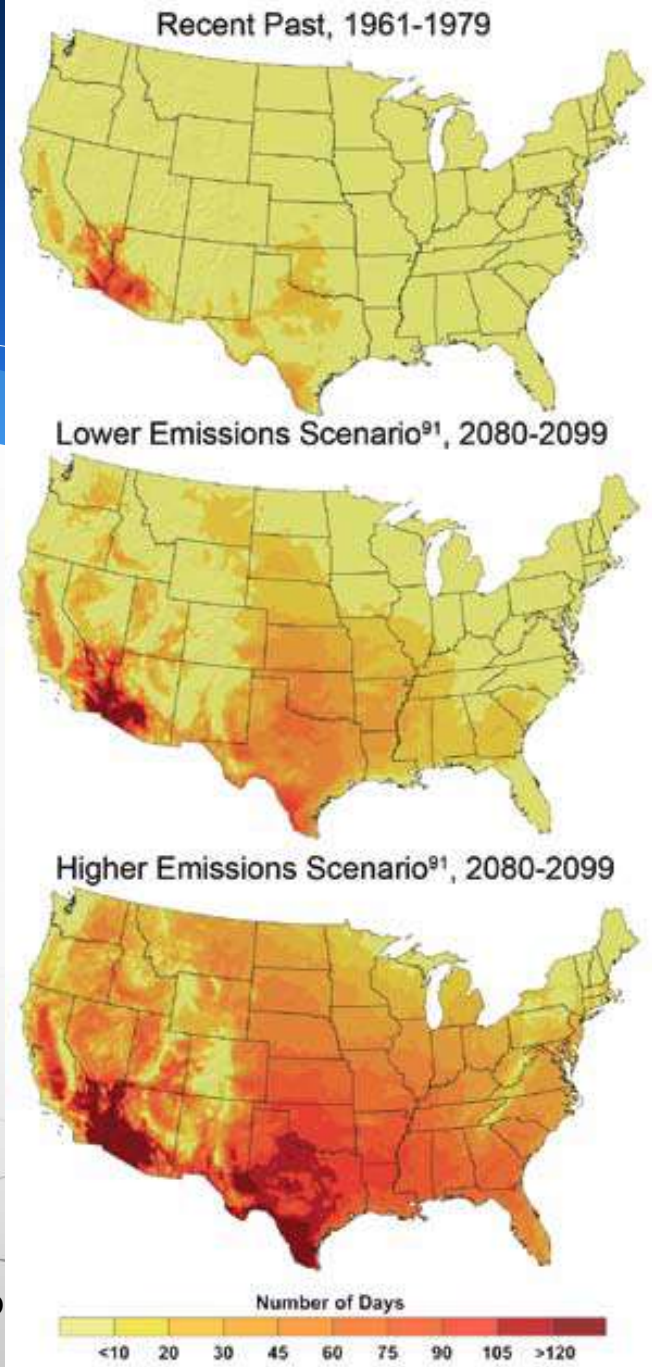
- \* **What's working?**
  - \* Best methods for identifying and using thresholds.
- \* **How can success be operationalized?**
  - \* Making results operational and generalizable.
- \* **What's next?**
  - \* Next steps for refining, operationalizing, and using thresholds.

# Workshop Agenda

- \* **Specific Examples**
  - \* **Science Focused**
  - \* **Community Focused**
- \* Breakout Session
- \* Report Back
- \* Wrap-up

# National Climate Assessment 2009

Extremes shown as  
days over 100°F

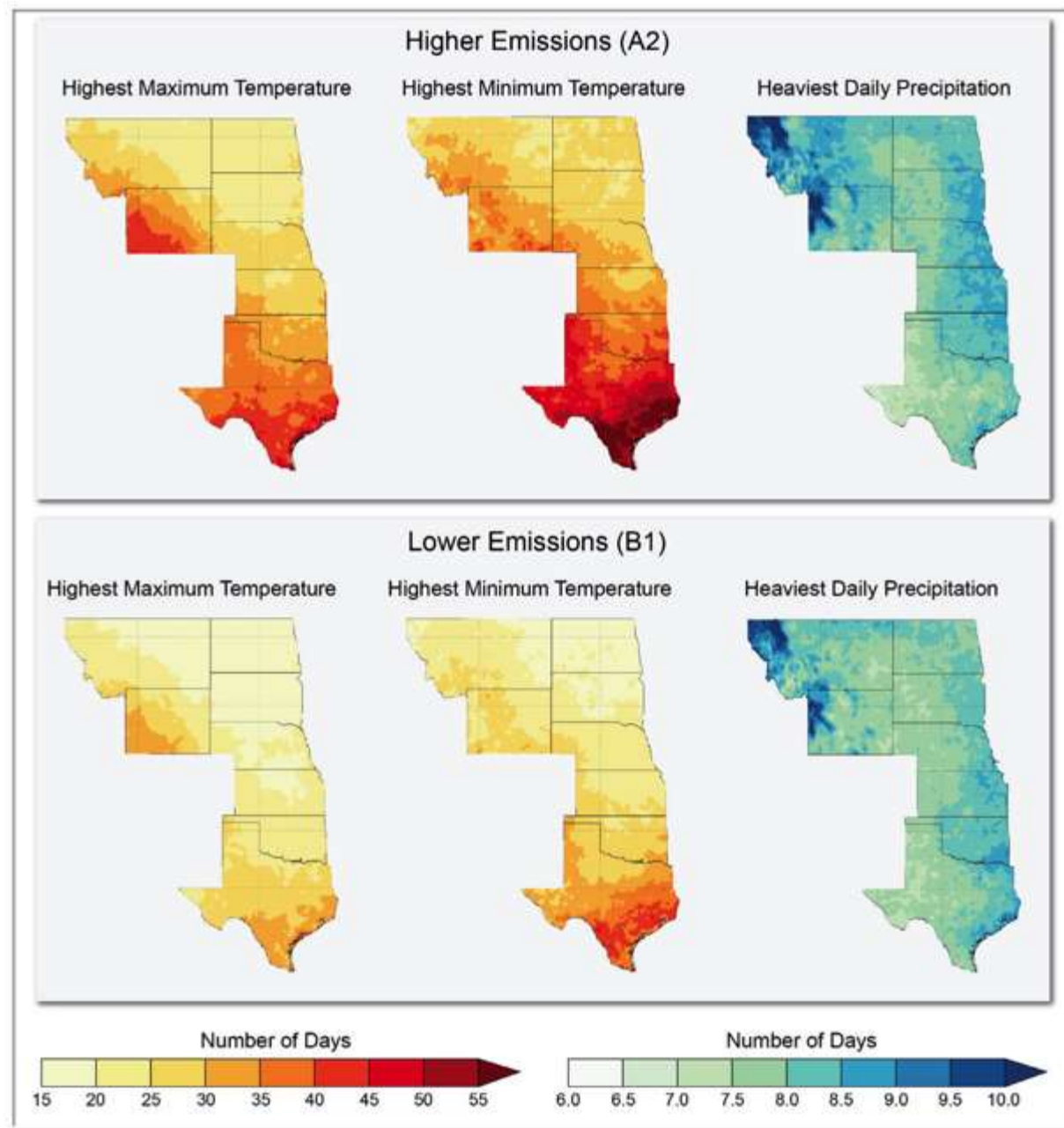


# NCA 2013

Extremes shown  
as days above the  
hottest 2% of days

National Climate Assessment, Draft  
Report, Great Plains Region, pg. 661

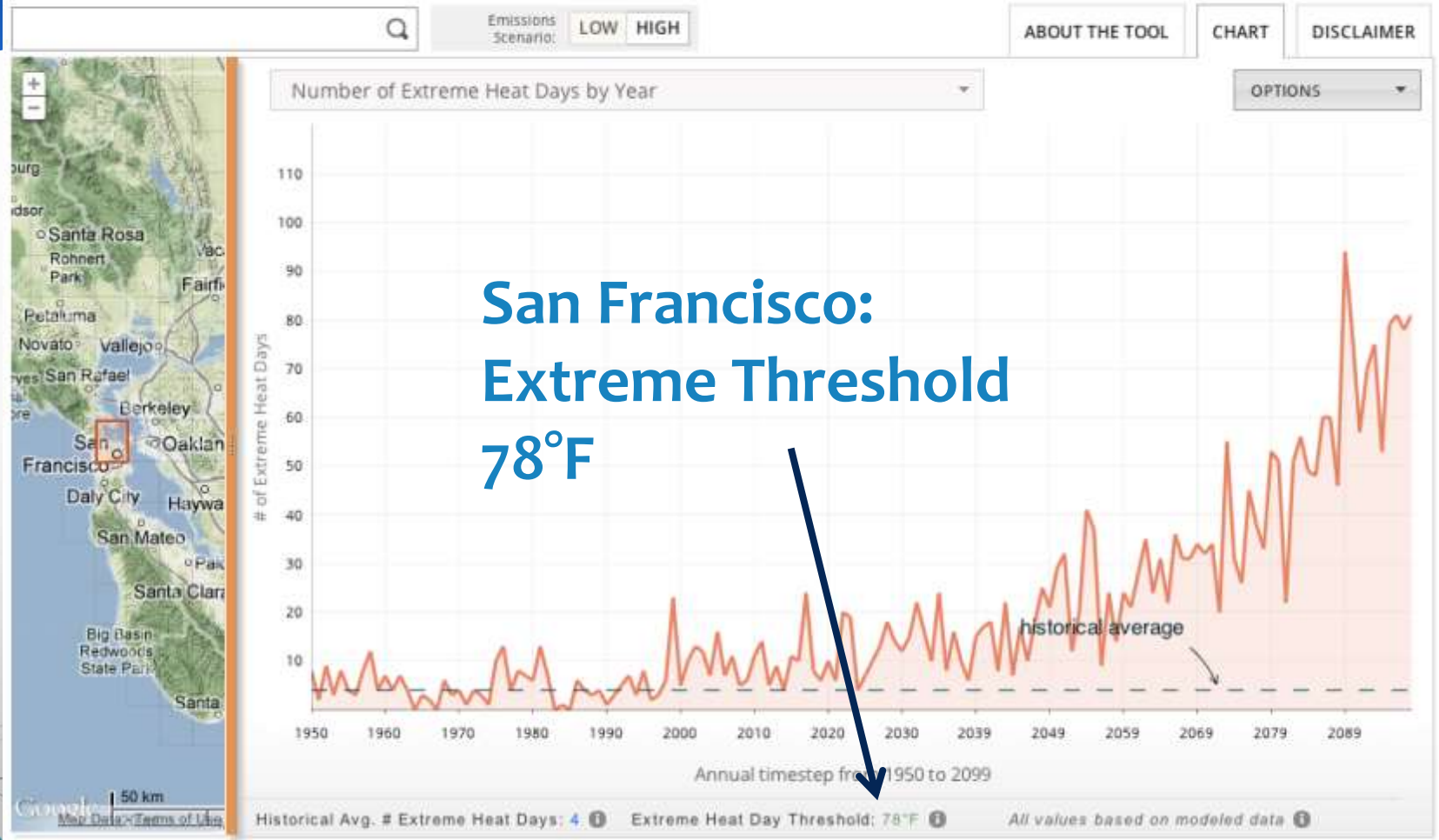
## Higher Emissions Lead to More Heat and Heavy Downpours





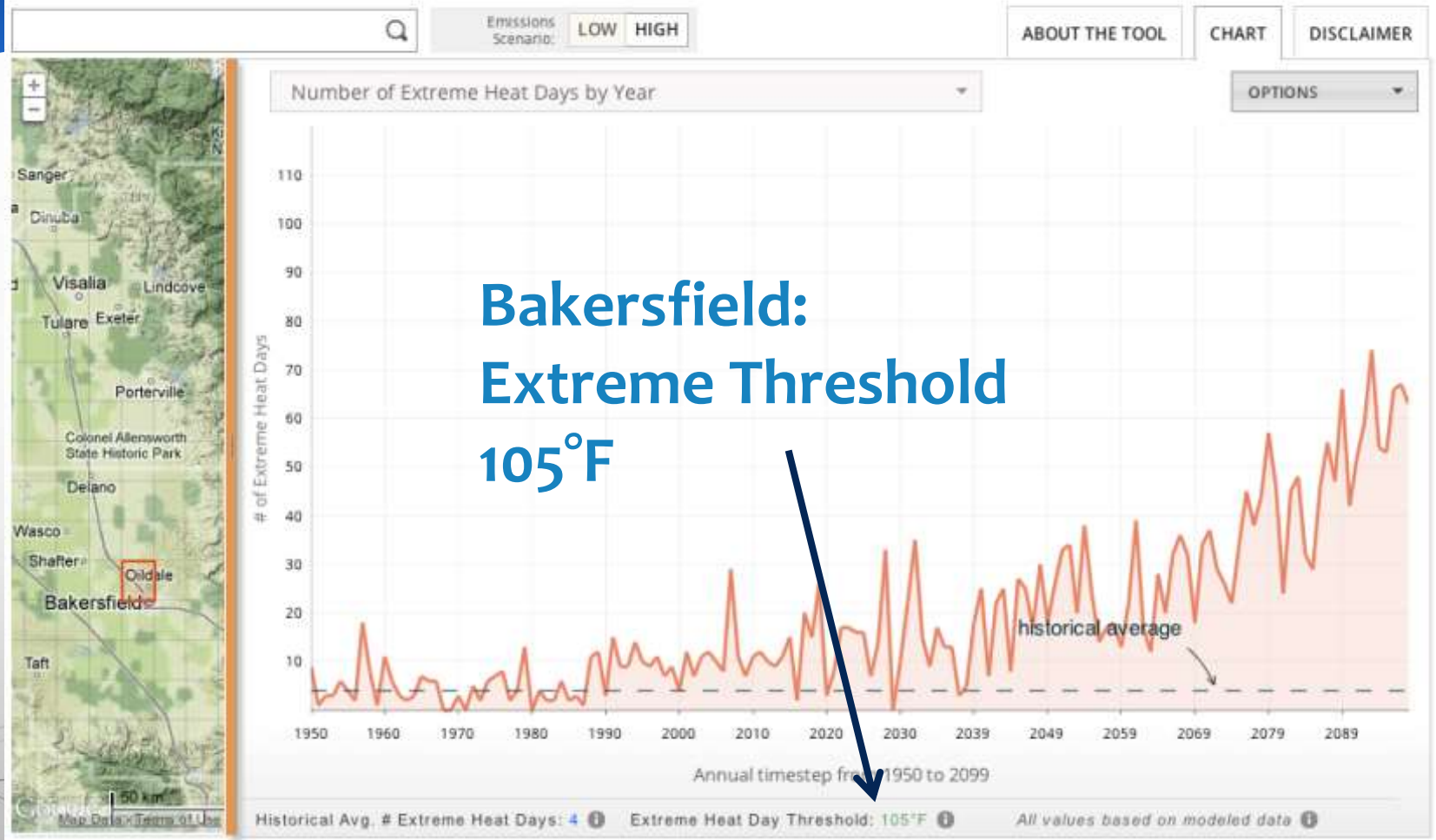
# CalAdapt: San Francisco

## TEMPERATURE: EXTREME HEAT TOOL



# CalAdapt: Bakersfield

## TEMPERATURE: EXTREME HEAT TOOL



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# Jamestown S'Klallam Tribe







# Key Areas of Concern


Vulnerability Ranking Table		Sensitivity Low → High				
Potential opportunity						
Low Vulnerability						
Medium—Low Vulnerability						
Medium Vulnerability						
Medium—High Vulnerability						
High Vulnerability						
Adaptive Capacity	AC0	S0	S1	S2	S3	S4
	AC1					
	AC2					
	AC3					
	AC4					

Salmon (Long-term) 


Clams & Oysters (Long-term) 

Shellfish Biotoxins 

Transportation Hwy 101 


Tribal Campus Water Supply 


Cedar Trees 

Casino and Longhouse Market 

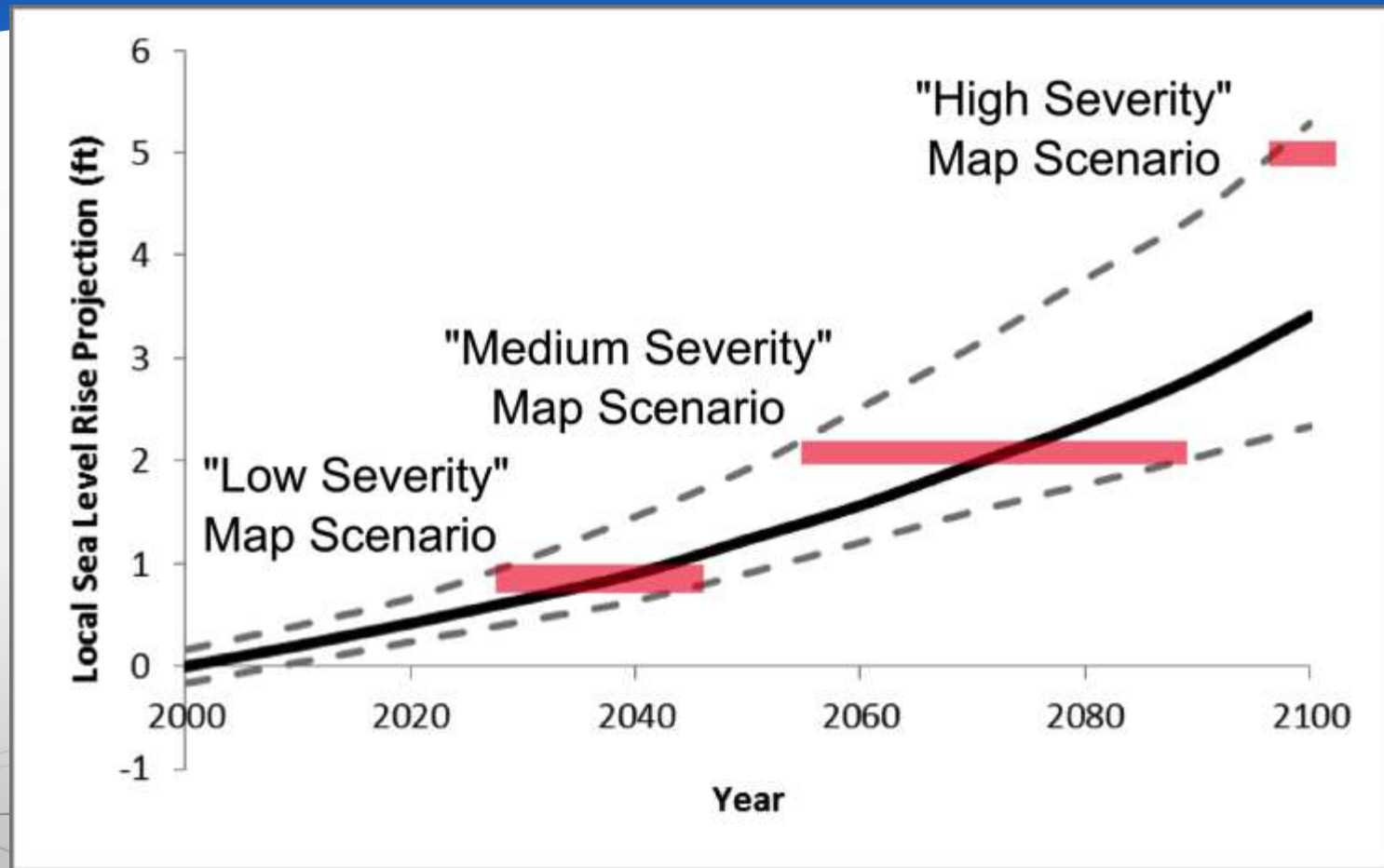
Jamestown Beach Water Supply 

Wildfire 

NR Lab & Planning Dept. Buildings 

Tribal Campus Wastewater Tank 

# Sea Level Rise and Storm Surge



# Tucson, Arizona



**POPULATION:** 1,020,000 people

**WATER:** Colorado River, groundwater, reclaimed

**ECONOMY:** Tourism/recreation, research/biomedical, real estate/construction, military, retirees... **poverty**





# Tucson, Arizona



**Fire: economy, ecosystems, erosion, structures, air quality**

**Water: proximate growth, distant water supply**





# Stakeholder Engagement

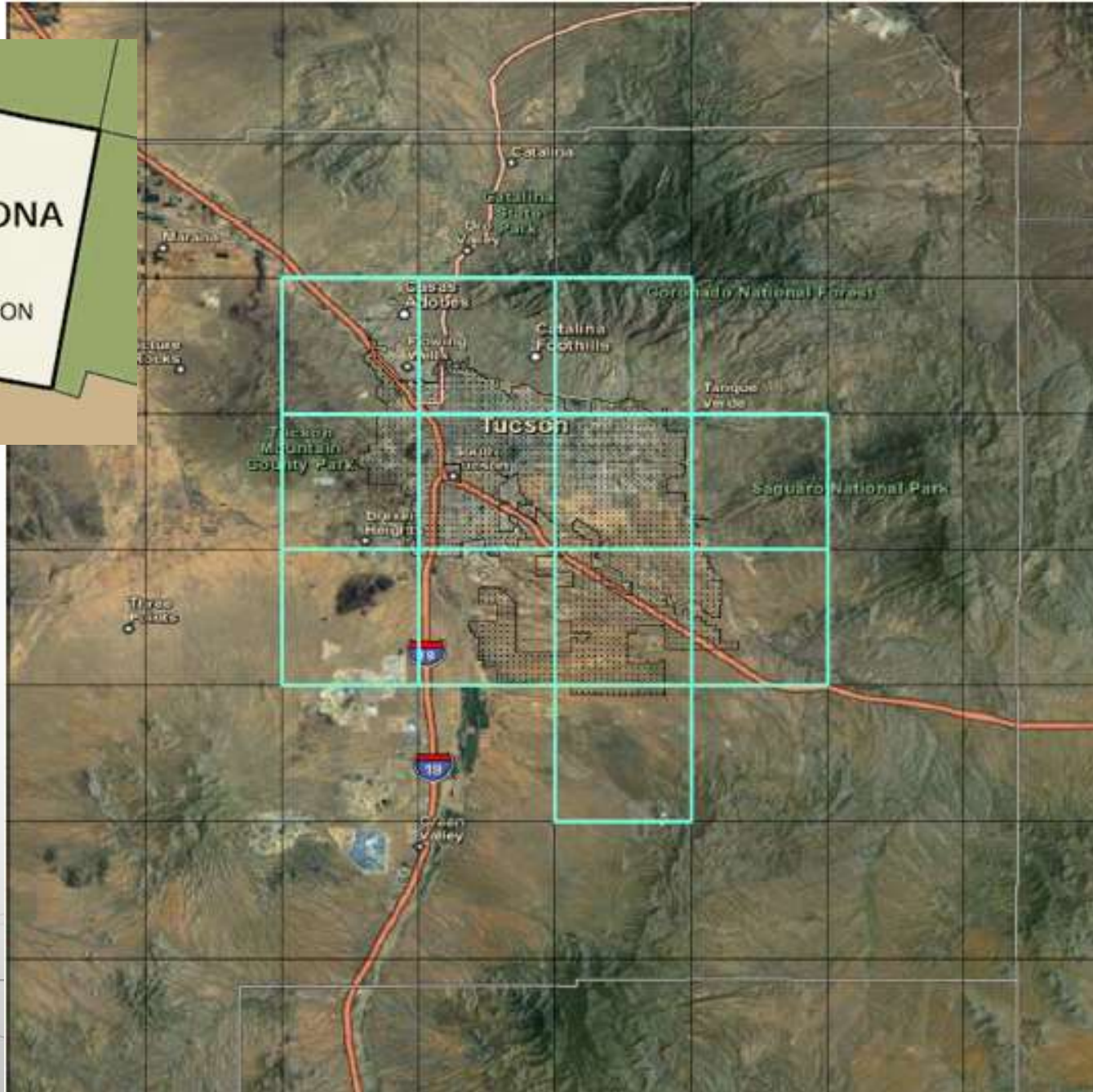
- N = 40
- Survey question format
- Mostly interview responses (n = 27)
- 13 written responses

Identify:

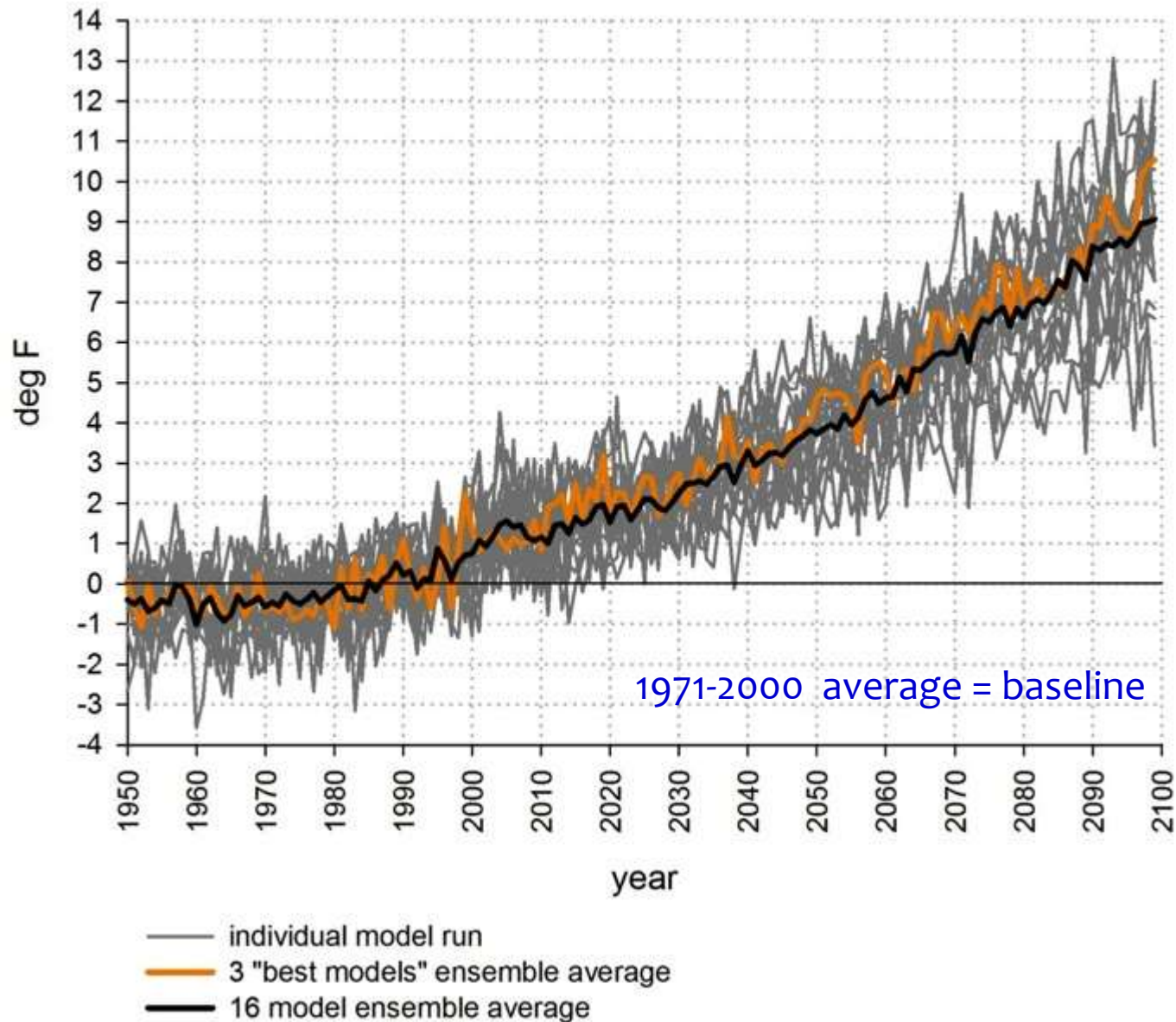
- Rank, importance of climate extremes
- Key thresholds related to job responsibilities

Temperature				IMPORTANT	MOST IMPORTANT
<b>SINGLE DAY EVENTS</b>					
Daily maximum exceeding:		*F	(e.g. 110°F)		
Daily minimum below:		*F	(e.g. 20°F)		
<b>HEAT WAVES</b>					
	: consecutive days above a daily maximum of:		*F (e.g. 110°F)		
<b>COLD SNAPS</b>					
	: consecutive "freeze" days		(Daily min ≤ 32°F)		
	: consecutive "hard freeze" days		(Daily min ≤ 28°F)		
<b>OTHER (WRITE IN YOUR OWN BELOW)</b>					

Precipitation				IMPORTANT	MOST IMPORTANT
<b>SINGLE DAY EVENTS</b>					
Intense Precipitation, with precipitation exceeding:		inches /hour	(e.g. 0.5in/hr)		
<b>WET SPELLS</b>					
	: consecutive days with precipitation exceeding:		inches /hour (e.g. 0.1in/hr)		
<b>DRY SPELLS/DROUGHTS</b>					
	: consecutive days with no measurable precipitation				
<b>MONSOON ONSET</b>					
(Day of Year)	: with ≥ .25 inch/day of precipitation for three consecutive days after 1 May.				
<b>OTHER (WRITE IN YOUR OWN SUGGESTION)</b>					

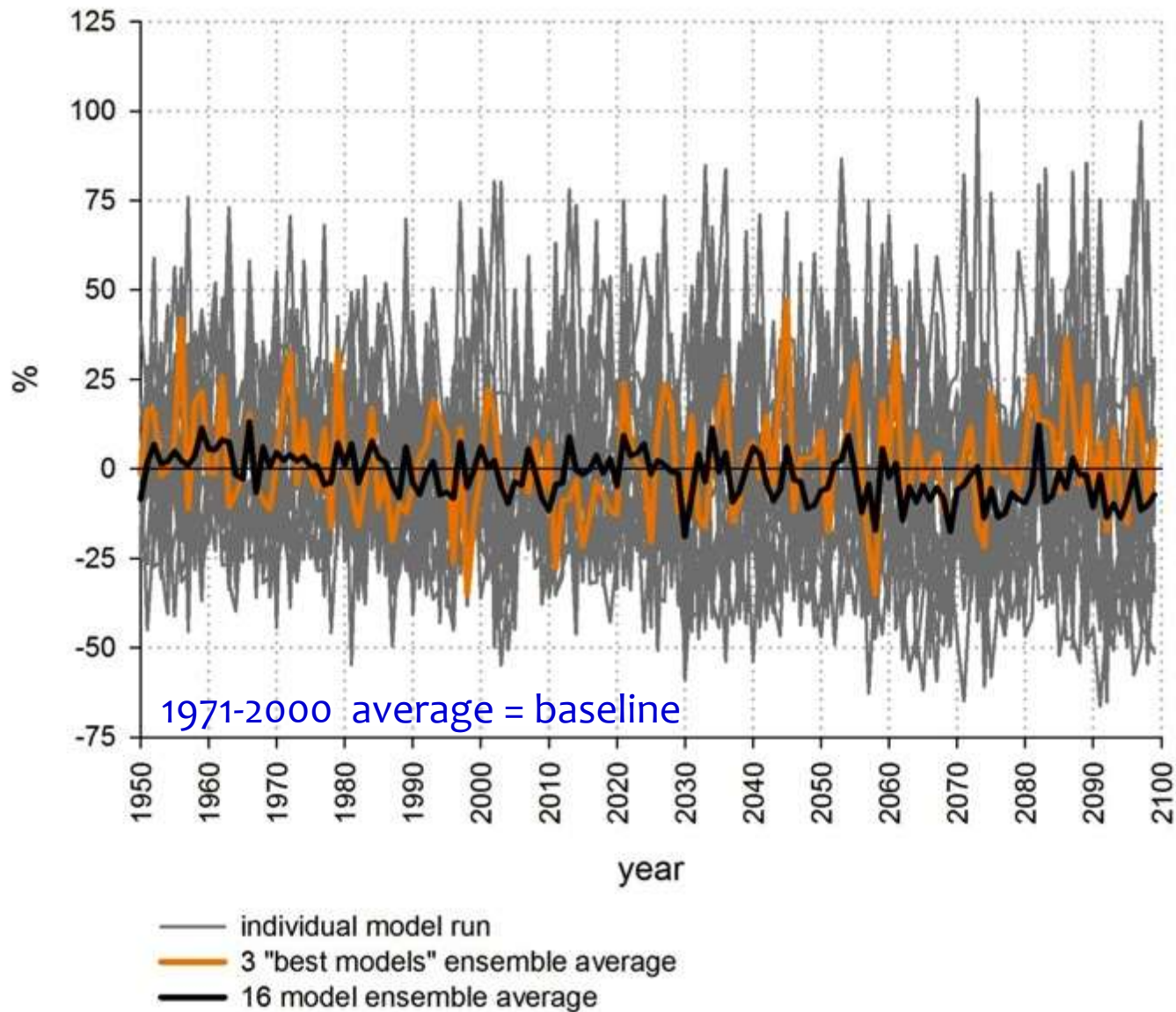


# Annual Temperature – A2 (High)



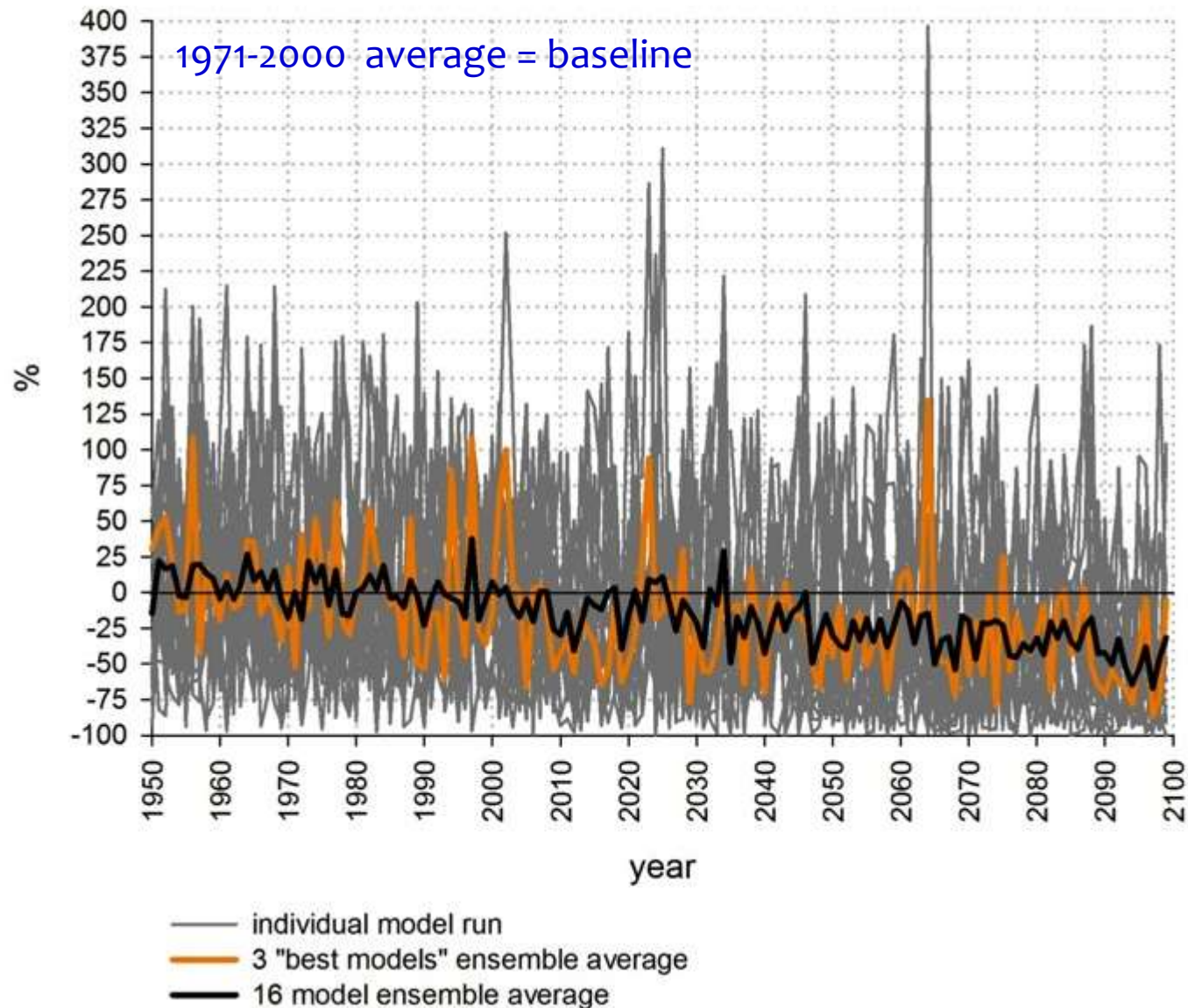


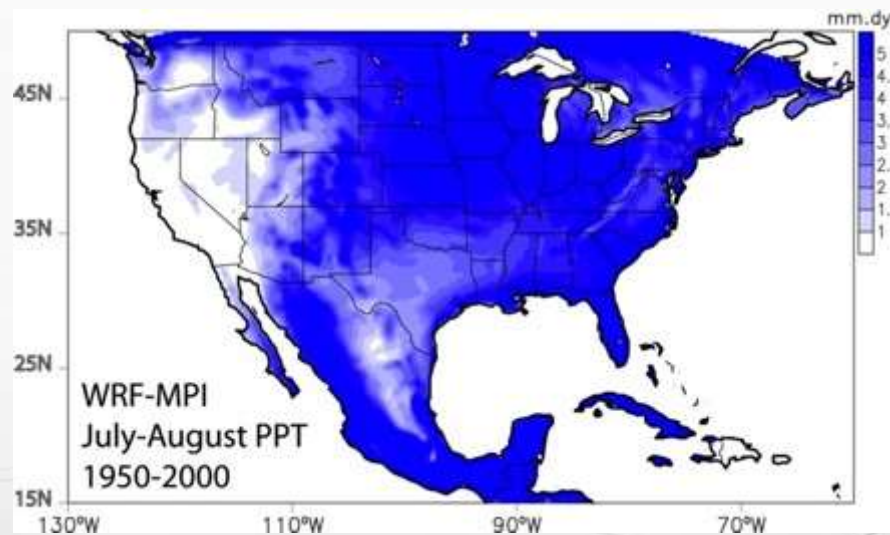
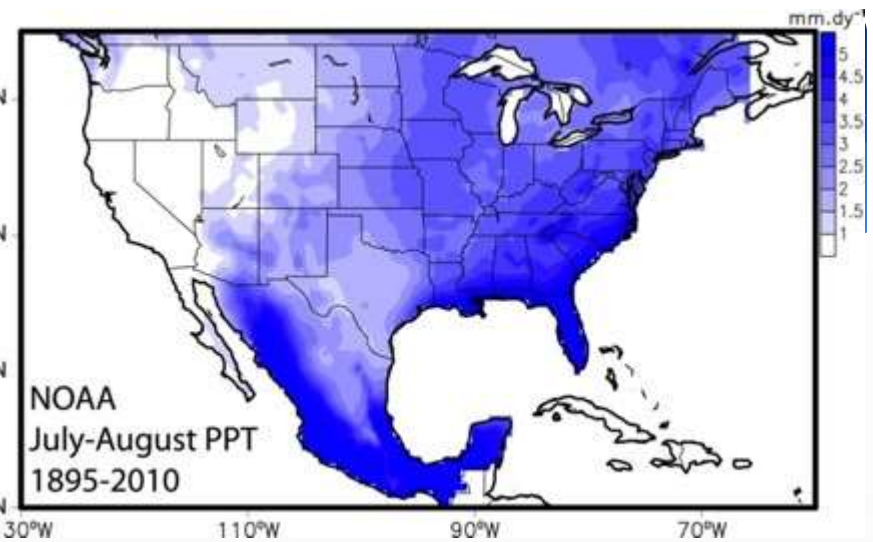
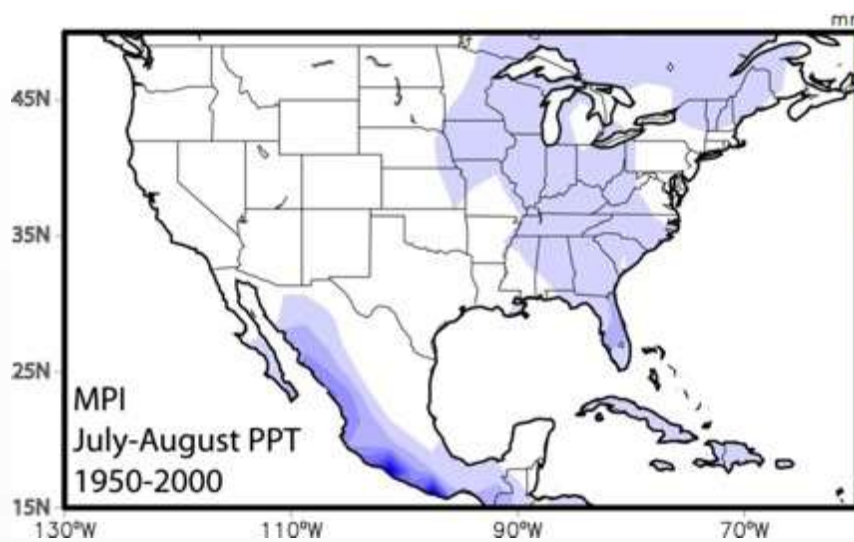
# Annual Precipitation – A2 (High)





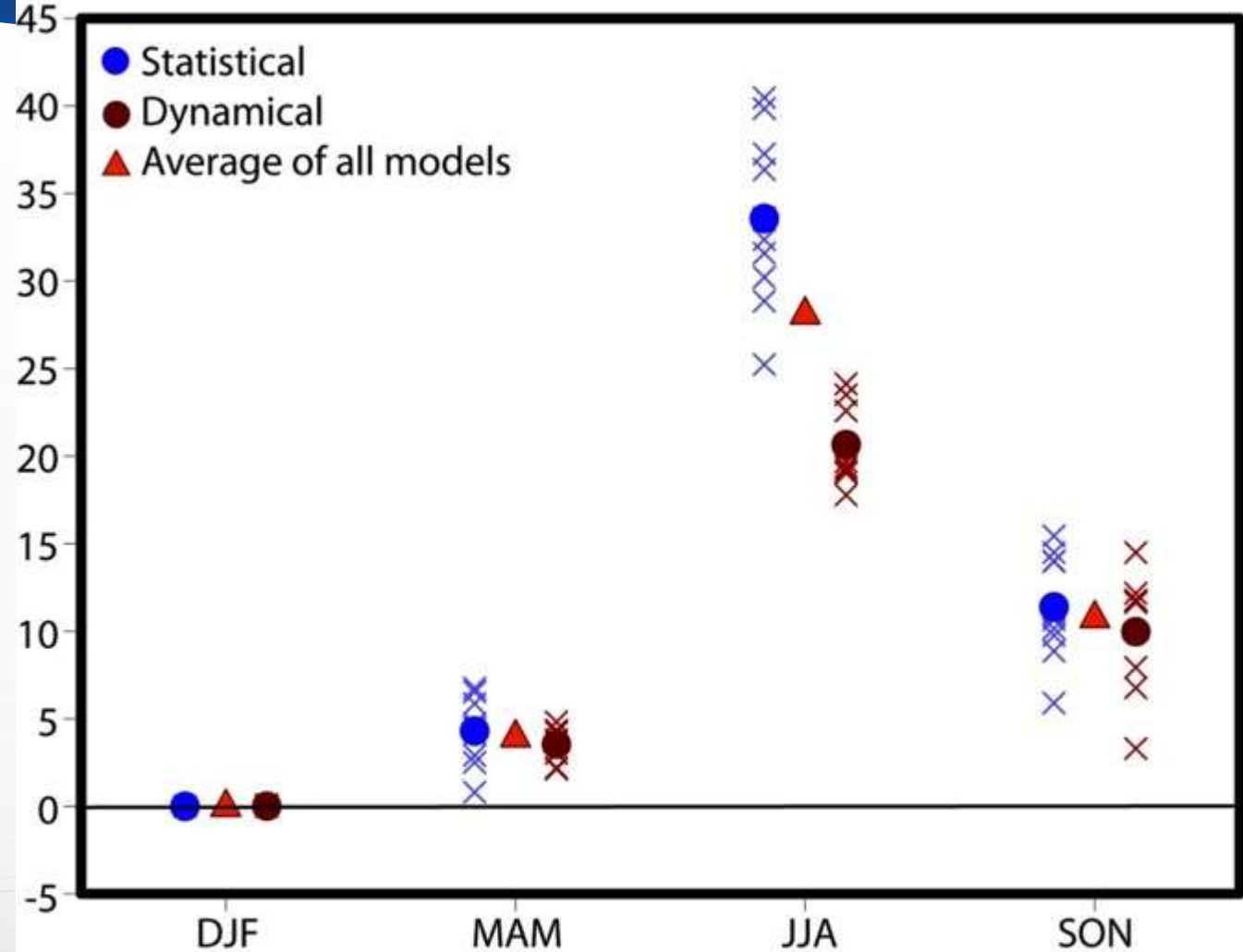
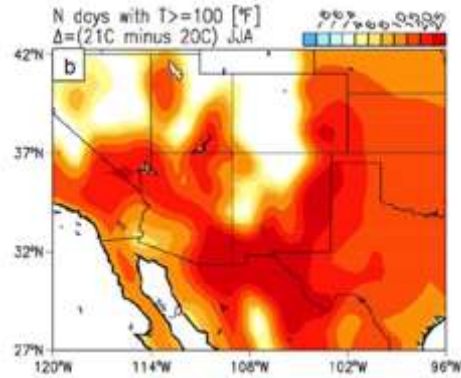
# Spring Precipitation – A2 (High)





**GCM-RCM**

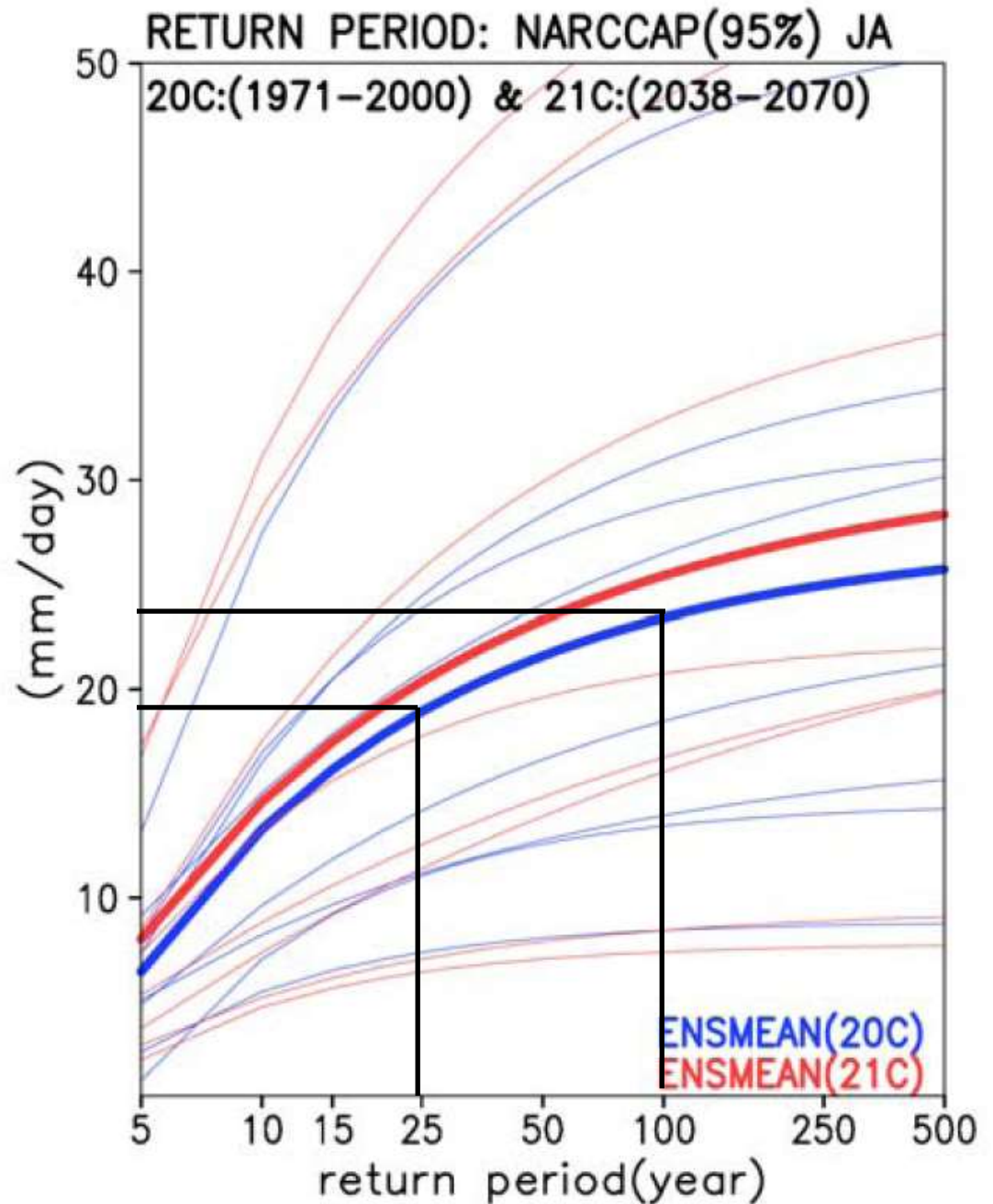
# Tucson # Days with TEM > 100°F



2038-2070 minus 1971-2000 (A2)

# Change in the Distribution of Daily Maximum Summer Precipitation

2038-2070  
minus  
1971-2000  
(A2)





# Tucson Summary

- Extreme Tmax
- Length Tmax season
- Extreme Tmin & length
- Extreme precipitation
- Monsoon onset
- Consecutive dry days



# Workshop Agenda

- \* Specific Examples
- \* **Breakout Session**
- \* Report Back
- \* Wrap-up

# Breakout Session

- \* Appoint Recorder and Reporter
- \* Help make sure everyone gets to comment
- \* Three key discussion topics (15 min each)
- \* Start with brief introduction
  - \* Who you are
  - \* Who you are with
  - \* What you focus on

# Breakout Session: Topic #1

## What's Working?

- \* What weather and climate variables do you currently monitor?
- \* Thresholds your organization uses to change operations, send out alerts, or take action?
- \* Are thresholds static or dynamic?
- \* What data do you use and where do you get it?
- \* How well does your current approach work?



# Breakout Session: Topic # 2

## How can successes be operationalized ?

- \* How should they be updated in changing climate conditions?
- \* Concerns and opportunities with using thresholds?
- \* Guidance for climate scientists?
- \* Guidance for communities?

# Breakout Session: Topic # 3

## Next Steps?

- \* Is the effort to customize justified? Do thresholds matter?
- \* What does the climate science community need?
- \* What do communities and decision makers need?
- \* Other? (e.g. communicating uncertainty)

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# Report Back

- \* **What's working?**
- \* **How can success be operationalized?**
- \* **What's next?**



# Workshop Agenda

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- \* **Wrap-up**

# Thank You !!!

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